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Complete Specification for the invention entitled :

"BAR CONVEYOR AND PITCH
LINK THEREFOR"

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PATENT OFFICE



This invention relates to a pitch link for use in a bar conveyor, and more particularly, but not exclusively, for use in a bar conveyor for harvesting machines such as vegetable harvesters.

5 The basic objective of a bar conveyor is to provide a plurality of rigid bars or bar sections in parallel relationship and linked at their adjacent ends in such a manner as to provide longitudinal flexibility for the conveyor whereby it may traverse around drive
10 and idler sprocket arrangements in the harvesting machine.

 There are two conventional forms of bar conveyor constructions presently in use, the first of which comprises a plurality of steel bars or rods the ends
15 of which are bent to form loop sections adapted to interlock with similar loop sections on adjacent bars to form a length of bar conveyor comprising bars in spaced parallel relationship with their ends flexibly interconnected through the loop arrangements.

20 The major disadvantages with this type of known conveyor are that the loop arrangements are subject to wear, the total weight of the conveyor is relatively high and the conveyor is noisy during operation.

 The second conventional form of bar conveyor
25 comprises two lengths of flexible belt extending in the

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direction of the conveyor and spaced apart and linked by steel rods the opposite ends of which, at their points of attachment to the respective belts, are flattened with attachment being facilitated by rivets. The portions of the straps between the ends of the bars provide the required longitudinal flexibility for the conveyor.

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The major disadvantages with this alternative form of conventional arrangement are that the rivets together with the belts are subject to wear due to contact with the ground, whilst the conveyor is not capable of ready disassembly for maintenance purposes.

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It is an object of the present invention to overcome the above disadvantages with the conventional forms of bar conveyors.

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The invention therefor envisages a pitch link for use in flexibly joining adjacent portions of at least two bars in a bar conveyor, said pitch link being manufactured from a plastics, rubber or like

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flexible material and comprising at least two end sections having holes or apertures therein for, in use, receiving said portions of adjacent bars in spaced parallel relationship in a bar conveyor, said end sections being interconnected by at least one web of said material having flexibility transversely of its length.

Such a pitch link enables adjacent ends or mid portions of at least two bars in a bar conveyor to be interconnected whilst the joining web provides the necessary degree of longitudinal flexibility for the bar conveyor as a whole to allow it to traverse about drive and idler sprocket arrangements.

In the case where the pitch link is to interconnect adjacent ends of two parallel bars the apertures or holes may be blind holes against the inner ends of which the ends of the bars abut, whilst in the case where the pitch link is to interconnect adjacent portions of two parallel bars somewhere along the lengths thereof, such as at their mid-portions, the holes extend completely through the end sections.

Several preferred forms of the invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a side elevational view partly in section of portion of a vegetable harvester incorporating a bar conveyor which in turn includes pitch links in accordance with the present invention,

FIGURE 2 is a perspective view of portion of the edge of a bar conveyor showing a number of bars interconnected by arrangements of pitch links according to a first preferred form of the invention,

FIGURE 3, is a side elevational view of the portion of the bar conveyor of Figure 1,

FIGURE 4 is a plan view of the portion of the bar conveyor of Figures 1 and 2,

5 FIGURE 5 is a plan view of one side edge of a section of bar conveyor incorporating pitch links according to a second preferred form of the invention,

FIGURE 6 is a plan view of one side edge of a section of bar conveyor incorporating pitch links
10 according to a third preferred form of the invention, and

FIGURE 7 is a plan view of a portion of a bar conveyor midway across its transverse width and illustrating an arrangement of pitch links of the
15 type shown in Figures 2 to 4 as adapted for such a portion of a bar conveyor.

Referring to Figure 1 of the drawings which shows part of a vegetable harvester, there is provided a frame generally indicated as 10, having a lower
20 frame section 11 incorporating a pair of longitudinal frame members 12 on either side of the harvester and interconnecting transverse members (not shown). Pairs of front and rear upstanding frame members 13 and 14 extend upwardly from each frame member 12 and
25 side panels 15 extend between the longitudinal and upstanding frame members 12, 13 and 14. Each longitudinal

frame member 12 carries a wheel support structure 16 which in turn carries a wheel axle 17 extending transversely beneath the frame with ground engaging wheels 18 on either side of the harvester. A towing linkage and power take-off arrangement 19 is supported across the top ends of the front upstanding frame members 13 and is stabilised by rigid strut members 20 extending from either side of the arrangement 19 to the tops of the respective rear upstanding frame members 14 as shown.

The arrangement 19 includes a pair of vertically spaced linkage arms 21 and 22 which are connected to a prime mover such as a tractor and incorporate a hydraulic ram (not shown) which allows the front of the harvester to be lowered about the axis of the support wheels 18 to a harvesting position as shown with a series of harvesting tynes 23 mounted on the front edge of the harvester engaging just below ground level such that when the harvester is drawn forward by the prime mover vegetables lying on the ground or just beneath ground level are forced up onto a bar conveyor 24 supported by and extending along and between the longitudinal frame members 12. The side panels 15 retain the vegetables on the bar conveyor within the harvester whilst soil, debris and other extraneous material falls back to the ground through the spaces between adjacent bars of

the bar conveyor. The rear end of the harvester may cooperate with a bag loading facility, storage hopper or a grading a sorting facility. The bar conveyor 24 is comprised of a plurality of parallel bars 25 and interconnecting pitch links according to the present invention and extends around from sprockets 26 supported on a shaft 27 extending transversely between the frame members 12 and around a rear drive sprocket and shaft arrangement 28 which is supported between side plates 29 attached to the rear ends of the members 12 via bolts communicating through slots 30 in the plates 29 to allow adjustment of the tension in the bar conveyor. The drive shaft of the arrangement 28 is driven by a hydraulic motor 31 fed via hydraulic lines from a hydraulic pump (not shown) which in turn is driven via a pulley arrangement (not shown) from a drive pulley 32 supported on a drive shaft 33 attached to a conventional power take-off 34 forming part of the arrangement 19. A pair of idler rollers 35 and 36 positioned as shown and extending between the frame members 12 provide support for the upper and lower conveyor runs, whilst a further pair of sprocket like members 37 supported on a transverse shaft 38 cooperate with the upper run of a bar conveyor to maintain some degree of tension in the upper run of the conveyor.

The harvester described above is merely illustrative

the boss section 44 has a hole 47 completely there-
through. The diameter of the holes 46 and 47
relative to the diameter of the bars 25 is such as
to provide a tight press-fit connection and the
5 engagement may be further secured if desired by use
of grooves and ridges, or knurled provisions as
described for the embodiment of figures 2 to 4.

As shown in Figure 5, the bar conveyor is
assembled by interconnecting adjacent pairs of bars
10 25 together by press fitting the boss section 44 of
the link onto the bar inwardly of the end thereof
a distance sufficient to leave an exposed bar end
portion, whereby, as shown in Figure 5, when a plurality
of bars 25 are linked together the boss sections 43
15 are received on the exposed end portions of the
bar 25 in overlying relationship to the inwardly
positioned boss section 44 of the adjacent link.

Referring to Figure 6 of the drawings, a third
preferred embodiment of the invention is illustrated,
20 and Figure 6 shows one side edge of a section of bar
conveyor incorporating the pitch link according to this
alternative preferred form of the invention. In this
embodiment, the bar conveyor comprises a plurality of
bars 25 of circular cross-section in spaced parallel
relationship with adjacent edges of adjacent bars being

interconnected by pitch links 48. Each pitch link 48 is moulded from a plastics material and comprises a single boss section 49 at one end and a pair of boss sections 50 at the other end interconnected to the single boss section 49 by a pair of integral flat strips 51 of plastics material to form a substantially V-shaped link as shown. The boss section 49 has a hole 52 therethrough and the boss sections 50 have axially aligned holes 53 therethrough. The diameter of the holes 52 and 53 relative to the diameter of the bars 25 are such as to provide a tight press-fit connection, and the engagement may be further secured if desired by use of groove and ridge, or knurled, provisions as described for the embodiments of Figures 2 to 5.

With this embodiment, the adjacent parallel spaced apart bars 25 are interconnected by inserting the single boss section 49 at one end of a link between the spaced apart boss sections 50 on the other end of an adjacent link, with the holes 52 and 53 in aligned relationship and press-fitting the arrangement onto the end of a bar as shown. Thereafter, the single boss section 49 of a further link is inserted between the spaced apart boss sections 50 of the first link and press-fitted onto the next adjacent bar and the respective positionings and press fittings of cooperating link ends at either ends of the bars

are related to build up the bar conveyor.

Also, as shown the boss section 50 which lies adjacent the outermost end of the bars includes a blind hole 53 in preference to a hole extending completely through the boss section.

Referring to figure 7 of the drawings, there is illustrated a portion of the bar conveyor midway between the ends of the bars 25 in which the bars are linked together by three row of links of type shown as 38a in figures 2 to 4 of the drawings which are merely pressed fitted onto the bars as shown in figure 7. In the example as the centre row of links are retained on either side by the two outermost rows of links the holes through the bosses of the centre row need not be press fitted onto the bars but may be of larger diameter and therefor be loosely pivotable about the bars.

The links shown in figures 5 and 6 may also be adopted to provide linkages along the centre of the bar conveyors by merely dispensing with blind holes and press fitting the link arrangements onto the centre portions of the bars.

As described, the above embodiments utilise links made from plastics material which provide the required degree of flexibility in the flat strips interconnecting the bosses at either end of the links, although the links may be manufactured from any

suitable material which has a sufficient degree of flexibility in the flat strip sections of the links.

5 In a still further preferred form of the invention (not illustrated), a bank of boss sections and interconnecting flat strips in one piece for interconnecting three or more bars together simultaneously may be utilised and still embody the basic concept of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A pitch link for use in flexibly joining adjacent portions of at least two bars in a bar conveyor, said pitch link being manufactured from a plastics, rubber or like flexible material and comprising at least two end sections having holes or apertures therein for, in use, receiving said portions of adjacent bars in spaced parallel relationship in a bar conveyor, said end sections being interconnected by at least one web of said material having flexibility transversely of its length.

2. A pitch link as claimed in claim 1, adapted to flexibly join adjacent end portions of successive pairs of said bars, wherein the aperture or hole in at least one of said end sections is a blind hole such that, in use, the end of the bar received therein will abutt the inner end of said blind hole.

3. A pitch link as claimed in claim 1, adapted to flexibly join adjacent portions of said bars inwardly of the ends thereof, wherein the apertures or holes in said end sections extend completely therethrough.

4. A pitch link as claimed in any one of the preceding claims, wherein said link has two end sections interconnected by said web.

5. A bar conveyor incorporating a plurality of pitch links according to claim 4, wherein end portions

of each successive pair of bars in the bar conveyor are linked by at least one of said pitch links press fitted thereon inwardly from the ends of the bars a distance sufficient to leave exposed bar end portions, with the bar of one successive pair, and the adjacent bar of the next successive pair, being joined by a pitch link press fitted onto the exposed end portions of the respective bars.

6. A bar conveyor incorporating a plurality of pitch links according to claim 4, wherein portions between the ends of said successive pair of bars in the bar conveyor are linked by at least one of said pitch links press fitted thereon, with the bar of one successive pair, and the adjacent bar of the next successive pair being joined by a similar pitch link.

7. A bar conveyor as claimed in claim 6, wherein three rows of pitch links are provided the outer rows of which are press fitted onto the same successive pairs of bars and the end sections of the inner row of said pitch links being loosely received around the bar of one successive pair and the adjacent bar of the next successive pair and are retained in position by the outer rows of said pitch links.

8. A pitch link as claimed in any one of claims 1 to 3, wherein said link has two end sections off-set from each other with said end sections being interconnected by said web.

● A bar conveyor incorporating a plurality of pitch links according to claim 8, wherein portions of adjacent bars are interconnected by press fitting one end section onto one of the bars inwardly of the end thereof a distance sufficient to leave an exposed end portion, whereby when a plurality of bars are linked together the end section of one link will be received on the exposed end portion of the bar in overlying relationship to the inwardly positioned end section of an adjacent link.

10. A pitch link as claimed in any one of claims 1 to 3, wherein said link comprises a single end section at one end and a pair of spaced apart end sections at the other end interconnected to the single end section by a pair of said webs to form a substantially V-shaped link.

11. A bar conveyor incorporating a plurality of pitch links according to claim 10, wherein portions of adjacent bars are interconnected by inserting the single end section on one end of a first link between the pair of spaced apart end sections on the other end of a second adjacent link with the holes through said single and spaced apart end sections in aligned relationship and positioned onto a bar with at least said pair of spaced apart end sections being in press fitted engagement with said bar, with successive pitch

links being positioned such that the single end section of each respective pitch link is received between the spaced apart end sections of an adjacent link and positioned on a bar whereby the arrangement of pitch links and bars form said bar container.

12. A pitch link substantially as hereinbefore described with reference to figures 2 to 4 and 7, or figure 5, or figure 6, of the accompanying drawings.

13. A bar conveyor incorporating a plurality of pitch links according to claim 12.

14. A machine incorporating a bar conveyor as claimed in any one of claims 5, 6, 7, 9, 11 or 13.

DATED this 17th Day of November, 1976

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